DEPARTMENT OF ELECTRONICS AND ELECTRICAL COMMUNICATION ENGINEERING (EEC)
FACULTY OF ENGINEERING
TANTA UNIVERSITY

EEC4122: Satellite Communication Systems (Fall 2015) Chapter 2 Orbits and Launching Methods

Problem Set

Mahmoud Selim

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P1: Show that for the ellipse the differential element of area $dA = r^2/2\ dv2$, where dv is the differential of the true anomaly. Using Kepler's second law, show that the ratio of the speeds at Apogee and perigee is equal to

$$(1-e)/(1+e)$$

P2: The orbit for an earth-orbiting satellite has an eccentricity of 0.15 and a semimajor axis of 9000 km. Determine:
(a) its periodic time;
(b) the apogee height;
(c) the perigee height.
Assume a mean value of 6371 km for the earth's radius.

P3: A satellite in polar orbit has a perigee height of 600 km and an apogee height of 1200

km. Calculate:
(a) the mean motion,
(b) the rate of regression of the nodes, and
(c) the rate of rotation of the line of apsides.
The mean radius of the earth may be assumed equal to 6371 km.

P4: A satellite orbit has an eccentricity of 0.2 and a semi-major axis of 10,000 km. Find the values of
(a) the latus rectum;
(b) the minor axis;
(c) the distance between foci.

P5: A satellite has an inclination of 90° and an eccentricity of 0.1. At epoch, which corresponds to time of perigee passage, the perigee height is 2643.24 km directly over the north pole. For 1 day after epoch determine
(a) the true anomaly,
(b) the magnitude of the radius vector to the satellite.